A. I. A. File Number 25a21 or 25c

Standard Specification

for the use of

White-Lead Paint

NATIONAL LEAD COMPANY

A. I. A. File Number 25a21 or 25c

45-26

STANDARD SPECIFICATION

for the use of

WHITE-LEAD PAINT

NATIONAL LEAD COMPANY

NEW YORK
111 Broadway

BOSTON
131 State Street

CHICAGO
900 West 18th Street

SAN FRANCISCO
485 California Street

BUFFALO
116 Oak Street

CINCINNATI
659 Freeman Avenue

CLEVELAND
820 West Superior Avenue

ST. LOUIS
722 Chestnut Street

PHILADELPHIA
John T. Lewis & Bros. Co.
437 Chestnut Street

PITTSBURGH
National Lead & Oil Co. of Pa.
316 Fourth Avenue

INSTRUCTIONS

Unusual care has been taken in preparing these specifications to make them complete, absolutely reliable and in the most complete form possible.

The specifications are based on approved modern painting practice, and are authoritative in every detail. If followed implicitly by the painting contractor, therefore, a satisfactory job is assured.

It will be necessary, of course, in specifications to the painting contractor to include only those paragraphs of our specifications that cover the specific work to be done. For the user's convenience we have employed letters and numerals to designate the sections, their main divisions and the paragraphs of the latter.

If desired, detail of work to be done as outlined in Section C is the only part which need be written out in full. The details of materials and workmanship may then be covered by the following clause:

> *All painting work under this contract, except as hereinafter specified, shall be executed in strict conformity with the Standard Specification of National Lead Company, which Standard Specification is hereby declared and made part of this specification, with the same force and effect as if written herein in full.*

The specifications are printed on the right hand pages. On the left hand pages appear notes that refer to the correspondingly numbered paragraphs on the specification pages opposite. The notes in some instances give information about the products and formulas mentioned in the specifications; in other instances they explain and give reasons why certain recommendations are made in the paragraphs to which they refer.

The user will find space in these "note pages" to enter any notes or observations that he may wish to make for his own guidance or information.

INDEX

1. The following materials are covered in these specifications: white-lead, raw linseed oil, boiled linseed oil, flatting oil, turpentine, driers, varnish (suitable for enamel), shellac and putty.

STANDARD SPECIFICATION

FOR THE

USE OF WHITE-LEAD PAINT

SECTION A

Preparation and General Requirements

1. MATERIALS:

All materials used for the work shall be as described under "Section B" of the "Standard Specification for the use of White-Lead Paint."

2. DRAWINGS:

The painting contractor shall be furnished with all drawings, details and other information necessary for the painting of all classes of work which are to receive a painted finish.

3. GENERAL CONDITIONS:

The General Conditions of the American Institute of Architects, latest edition, shall form a part of this specification and contract, and all work shall be subject to the provisions thereof, in so far as they apply to work under this specification.

4. WORK INCLUDED:

(a) The painting contractor shall provide all labor, material, tools, staging and equipment necessary and include all painting and finishing work in connection with the building, both exterior and interior, unless otherwise specified.

(b) (Here describe generally the work which is to be painted.)

(c) (Here also describe work which is to be primed under other specifications, but which shall be finished under this specification.)

5. ALTERATIONS AND REMODELING:

All present work that is removed and reset, or that is affected in any way by the alterations and remodeling, shall be refinished to match the finished surfaces adjacent thereto.

6. STORAGE:

The painting contractor shall store his materials in one place in the building, and such storage place shall be kept neat and clean and all damage thereto or its surroundings shall be made good; care being taken in the storage of paints, oils, etc., to prevent all danger of fire. Oily rags shall be removed from the building every day upon the stopping of work.

Notes below refer to correspondingly numbered paragraphs on opposite page

7. WORKMANSHIP:

(a) Before any painting is done, all surfaces shall be clean, smooth and free from dust, dirt, grease, mortar, etc.

(b) All paint shall be evenly spread and thoroly brushed out.

(c) On new work, before priming, knots and sappy streaks shall be shellacked with one coat brushed out thin.

(d) No coat of paint shall be applied on wet or damp surfaces, and in no case until preceding coat is dry and hard.

(e) No painting shall be done on outside work in extremely cold, frosty, foggy or damp weather. Painting done in winter weather shall be done only when the temperature is above 50° F. and when all surfaces are dry.

(f) All exterior work shall be allowed to dry from two to four days before the next coat is applied and for interior work at least twenty-four hours for each coat.

8. SAMPLES:

Samples of all finishes shall be submitted to the architect for approval before applying; and finished work shall match same.

9. PUTTYING:

(a) No puttying shall be done until after the priming coat has been applied and is thoroly dry. All knot holes, dents, cracks, joints or other defects in the surface shall then be puttied up and smoothed over with a putty knife.

(b) Repainted work, where putty is to be applied, shall receive first a coat of half linseed oil and half turpentine before puttying. When putty is dry, any surplus putty must be removed.

10. STIPPLING:

Paint on interior plaster surfaces which is to be stippled shall be pounced with a stippling brush before the finishing coat has completely set up.

11. PREPARATION OF WOODWORK SURFACES:

(a) New woodwork shall be smoothed off with sandpaper where required and dusted clean before priming.

(b) From old work which has been painted before, all loose paint, scale, dirt and dust must be entirely removed. All parts where liquid paint remover has been used must be washed off with benzine or turpentine.

(c) The painting contractor shall carefully inspect all surfaces before applying any finish and if same is not in proper condition, he shall notify the architect in writing; otherwise the contractor will be held responsible for any defects in the finish arising therefrom.

16. Washing glass is not intended to be included in this specification. If the architect wishes it to be included, he should specifically mention it.

12. PREPARATION OF PLASTER SURFACES:

(a) Before any paint is applied, plaster surfaces, either new or old, must be made clean and smooth.

(b) All cracks and holes shall be filled with plaster of paris or approved patching plaster. Large cracks, before filling, shall be opened up in dove-tail shape clear to the lath and soaked with water. The filling plaster shall be leveled off even with the adjoining plaster surfaces, and when dry shall be sandpapered smooth.

(c) Walls that have been calcimined shall be washed until all calcimine is removed before applying any paint.

(d) Where new plaster to be painted is not properly aged, the surfaces shall be treated with a solution made by dissolving two pounds of zinc sulphate in one gallon of water. After the zinc sulphate solution has been applied, sufficient time must be allowed for the plaster to dry before priming.

13. PREPARATION OF METAL SURFACES:

All metal surfaces before painting shall be cleaned of grease, dirt, loose rust, loose scale and loose paint.

14. PREPARATION OF BRICK AND STONE SURFACES:

(a) New brick work shall not be primed until dry and at least two or three days of dry weather shall precede painting.

(b) If any mortar has become loose or washed out, all such damaged places shall be pointed with mortar or Portland cement before paint is applied.

(c) After priming, small defects in the surface shall be corrected with putty.

15. PREPARATION OF STUCCO AND CONCRETE SURFACES:

Stucco or concrete shall be allowed to stand and dry at least six months before paint is applied. If necessary to paint before this time, it shall be aged by washing with a solution made by dissolving two pounds of zinc sulphate in one gallon of water. After the zinc sulphate solution has been applied, sufficient time must be allowed for the stucco or concrete to dry before priming.

16. CLEANING:

Upon completion of the building, the painting contractor shall remove all paint spots from all finished work; and shall leave the entire premises free from rubbish caused by his work; and shall remove his equipment from the premises. He shall present the work clean and free from blemish.

17. The following materials are covered in these specifications: White-lead, raw linseed oil, boiled linseed oil, flatting oil, turpentine, driers, varnish (suitable for enamel), shellac and putty.

17. (b) A. S. T. M. specifications for white-lead will be found on page 20.

17. (c) A. S. T. M. specifications for raw linseed oil will be found on pages 22 and 23. Specifications are given for oil made from both South American and North American seed, because the specifications differ slightly and both sources are important in furnishing the supply. Oil conforming to either specification should be considered satisfactory.

17. (d) A. S. T. M. specifications for boiled linseed oil will be found on pages 29 and 30. Specifications are given for oil made from both South American and North American seed, because the specifications differ slightly and both sources are important in furnishing the supply. Oil conforming to either specification should be considered satisfactory.

17. (f) A. S. T. M. specifications for turpentine will be found on page 25.

17. (g) Government specifications for liquid paint drier will be found on page 26. Driers are agents, usually liquids, added to paint to hasten the oxidation and the hardening of the film. White-lead and linseed oil will dry without artificial aid in about three days, but the prevalence of dust and insects makes it generally desirable for paint to harden in eight to ten hours. A drier is therefore necessary. It is not harmful if good and not in excess of one quart to four gallons of oil. If too much is used, the paint dries on the surface and leaves the under part soft. Also crinkling of the surface of the paint is likely to follow.

17. (j) Good putty is necessary to give satisfactory results. Specifications are given to avoid use of putty containing improper materials. So often inferior putty is found on the market. If the architect desires, the best grade of linseed oil and whiting putty may be used for glazing.

SECTION B

Materials and Mixing

17. MATERIALS:

(a) All materials for painting shall be delivered at the building in unbroken packages, bearing the manufacturer's brand and name, and shall be used without adulteration.

(b) *White-Lead:*

All white-lead used for paint shall be pure white-lead of Dutch Boy brand, or its equal, and shall conform to the specifications of the American Society for Testing Materials.

(c) *Raw Linseed Oil:*

All raw linseed oil shall be pure settled oil, Dutch Boy brand or its equal, and shall conform to the specifications of the American Society for Testing Materials.

(d) *Boiled Linseed Oil:*

Where boiled linseed oil is to be used in paint it shall be pure boiled linseed oil, Dutch Boy brand or its equal, and shall conform to the specifications of the American Society for Testing Materials.

(e) *Flatting Oil:*

Where flatting oil is to be used in painting, it shall be Dutch Boy flatting oil.

(f) *Turpentine:*

All turpentine shall be of the best grade of pure spirits of turpentine and shall conform to the specifications of the American Society for Testing Materials.

(g) *Driers:*

All driers used shall be the product of an approved manufacturer and shall conform to "Standard Specification No. 20" of the United States Government.

(h) *Varnish (Suitable for Enamel):*

All varnish used shall be of grades suitable for mixing with the pigments specified.

(i) *Shellac:*

All shellac shall be composed of a pure gum shellac cut in pure denatured alcohol, using 4 pounds of gum to one gallon of alcohol.

(j) *Putty:*

Putty shall be composed of pure white-lead and whiting, mixed with pure linseed oil to putty consistency, and shall contain from ten to fifty per cent white-lead, depending on the purpose for which the putty is to be used. For puttying up nail holes and other defects the white-lead content shall be fifty per cent. For metal sashes the pigment content may include ten per cent of powdered litharge.

18. (a) It is important to use colors-in-oil in tinting. It is practically impossible to incorporate dry tinting colors. High grade tinting colors are important. The use of poor tinting materials is indicated when it is found that a much larger quantity than specified in our formulas is needed to match the desired tint. The use of such excessive quantities introduces adulteration into the paint.

18. (b) The directions for colors referred to are the specifications which must be written specially for each job and places for which are provided in Section C.

19. In order to thoroly incorporate the ingredients, especially to avoid streaking of tinting materials, the following order of mixing is recommended: *First*—place the proper amount of pure white-lead required by the formula in a large pail and break it up with just enough oil to bring it to a workable paste, using a wooden paddle to stir. *Second*—add colors for tinting if the paint is to be tinted, mixing them thoroly into the white-lead. *Third*—add the drier and stir thoroly. *Fourth*—add the remainder of the oil required by the formula, stirring thoroly. *Fifth*—put in the turpentine and stir the whole mass until thoroly mixed. *Sixth*—strain the paint thru a cheese cloth or fine wire mesh strainer.

20. (b) A formula marked with an asterisk* is an alternate to be specified instead of the formula immediately above it if turpentine is to be used instead of Dutch Boy flatting oil.

18. TINTING:

(a) When the paint is to be tinted, pure colors-in-oil, ground in pure linseed oil and of the highest grade obtainable, shall be used.

(b) The various colors, tints, or shades desired shall be in accordance with special directions given hereinafter.

19. MIXING:

All white-lead paint shall be mixed at the job in a manner to assure the proper incorporation of the ingredients, and in conformity with formulas as hereinafter given.

20. FORMULAS:

(a) The following formulas are for white paint, and take no account of tinting or coloring materials. Where tints or colors are required they shall be in accordance with the special description as given hereinafter.

(b) The formulas are divided into different classes for new exterior and interior woodwork; old exterior and interior woodwork; plaster painting and painting on brick, stone, stucco, concrete and metal.

(c) In formula No. 1 the painter shall exercise his own discretion in using larger or smaller quantities of thinners, according to whether the wood is oil-absorbing, as white pine, poplar and basswood, or less permeable, as yellow pine, cypress, spruce and hemlock. In formulas No. 4 and No. 6 the painter shall use his discretion in using more or less thinners, according to the condition of the surface.

(d) Where it is advisable to increase the quantity of turpentine, as in southern exposures to prevent blistering, a corresponding decrease shall be made in the specified amount of linseed oil.

20. (e) Formula No. 1 makes 9 gallons of paint which should cover about 5,175 square feet, one coat.

20. (e) Formula No. 2 makes 6 gallons of paint, which should cover about 3,600 square feet, one coat.

20. (e) Formula No. 3 makes 6½ to 7 gallons of paint, which should cover about 3,900 to 4,200 square feet, one coat.

20. (f) Paint intended for old woodwork outside, that is, wood which has been painted before but is in need of repainting, should be mixed differently from that intended for new work.

20. (f) Two coats are enough on old work as the old paint serves as a priming coat.

20. (f) Formula No. 4 makes 7 gallons of paint, which should cover about 4,200 square feet, one coat.

20. (f) Formula No. 5 makes 6½ to 7 gallons of paint, which should cover about 3,900 to 4,200 square feet, one coat.

20. (e) *Painting New Outside Wood:*

FORMULA NO. 1

Priming Coat

100 pounds Dutch Boy white-lead.
†4 gallons pure raw linseed oil.
†2 gallons pure turpentine.
1 pint pure drier.

FORMULA NO. 2

Second Coat

100 pounds Dutch Boy white-lead.
1½ gallons pure raw linseed oil.
1½ gallons pure turpentine.
1 pint pure drier.
(If the new wood is shingles, increase the linseed oil to 2 gallons and decrease the turpentine to 1 gallon).

FORMULA NO. 3

Third Coat

100 pounds Dutch Boy white-lead.
3½ to 4 gallons pure raw linseed oil.
1 pint pure turpentine.
1 pint pure drier.

20. (f) *Repainting Outside Wood:*

FORMULA NO. 4

First Coat

100 pounds Dutch Boy white-lead.
†2 gallons pure raw linseed oil.
†2 gallons pure turpentine.
1 pint pure drier.

FORMULA NO. 5

Second Coat

100 pounds Dutch Boy white-lead.
3½ to 4 gallons pure raw linseed oil.
1 pint pure turpentine.
1 pint pure drier.

†See 20. Formulas (c), page 5 of Specification.

20. (g) Formula No. 6 makes 10 gallons of paint, which should cover about 5,750 square feet, one coat.

20. (g) Formula No. 7. The flatting oil formula makes 5 to 6 gallons of paint, which should cover about 3,500 to 4,200 square feet, one coat. The linseed oil and turpentine formula makes 5½ gallons of paint, which should cover about 3,300 square feet, one coat.

20. (g) Formula No. 8. The flatting oil formula makes 5 to 6 gallons of paint, which should cover about 3,500 to 4,200 square feet, one coat. The varnish and turpentine formula makes 5 gallons of paint, which should cover about 3,600 square feet, one coat.

20. (g) *Painting New Inside Wood:*

FORMULA NO. 6

Priming Coat

100 pounds Dutch Boy white-lead.
†3 gallons pure raw linseed oil.
†3 gallons Dutch Boy flatting oil.
1 pint pure drier.

or

*100 pounds Dutch Boy white-lead.
†3 gallons pure raw linseed oil.
†3 gallons pure turpentine.
1½ to 2 pints pure drier.

FORMULA NO. 7

Second Coat

100 pounds Dutch Boy white-lead.
2 to 3 gallons Dutch Boy flatting oil.

or

*100 pounds Dutch Boy white-lead.
½ gallon pure raw linseed oil.
2 gallons pure turpentine.
1 pint pure drier.

FORMULA NO. 8

Third Coat

Flat Finish

100 pounds Dutch Boy white-lead.
2 to 3 gallons Dutch Boy flatting oil.

or

*100 pounds Dutch Boy white-lead.
2 gallons pure turpentine.
1 pint pale varnish (suitable for enamel).
½ pint pure drier.

*See 20. (b), page 5 of Notes.

†See 20. Formulas (c), page 5 of Specification.

20. (g) Formula No. 9 makes 5 to 5½ gallons of paint, which should cover about 3,000 to 3,300 square feet, one coat.

20. (g) Formula No. 10. This formula is restricted to dark colors because light colored paint containing considerable raw linseed oil will yellow badly when used on interior surfaces.

20. (g) Formula No. 10. The flatting oil formula makes 6¼ gallons of paint, which should cover about 3,750 square feet, one coat. The turpentine formula makes 6 to 6½ gallons of paint, which should cover 3,600 to 3,900 square feet, one coat.

20. (g) Formula 10A makes one gallon of paint, which should cover about 500 square feet, one coat.

20. (g) *Painting New Inside Wood*—Continued:

FORMULA NO. 9

Third Coat

Egg-Shell Gloss Finish

100 pounds Dutch Boy white-lead.
1½ to 2 gallons Dutch Boy flatting oil.
¾ gallon pale varnish (suitable for enamel).

or

*100 pounds Dutch Boy white-lead.
1½ to 2 gallons pure turpentine.
¾ gallon pale varnish (suitable for enamel).
½ pint pure drier.

FORMULA NO. 10

Third Coat

Oil-Gloss Finish

The following formula shall be used only for dark colors:

100 pounds Dutch Boy white-lead.
3 gallons pure raw linseed oil.
¼ gallon Dutch Boy flatting oil.
1 pint pure drier.

or

*100 pounds Dutch Boy white-lead.
3 to 3½ gallons pure raw linseed oil.
1 pint pure turpentine.
1 pint pure drier.

FORMULA NO. 10A

Third Coat

Enamel Finish

The following formula shall be used for light colors:

3 pounds Dutch Boy white-lead.
1 gallon pale varnish (suitable for enamel).

The white-lead used shall be first mixed with turpentine in the proportion of 3 pounds to 1 gill and allowed to stand overnight. The thinners shall then be drawn off and the pale varnish added to the white-lead.

*See 20. (b), page 5 of Notes.

20. (h) Formula No. 11. The flatting oil formula makes 5 to 6 gallons of paint, which should cover about 3,500 to 4,200 square feet, one coat. The linseed oil and turpentine formula makes 5½ gallons of paint, which should cover about 3,300 square feet, one coat.

20. (h) Formula No. 12. The flatting oil formula makes 5 to 6 gallons of paint, which should cover about 3,500 to 4,200 square feet, one coat. The varnish and turpentine formula makes 5 gallons of paint, which should cover about 3,600 square feet, one coat.

20. (h) Formula No. 13 makes 5 to 5½ gallons of paint, which should cover about 3,000 to 3,300 square feet, one coat.

20. (h) *Repainting Inside Wood:*

FORMULA NO. 11

First Coat

100 pounds Dutch Boy white-lead.
2 to 3 gallons Dutch Boy flatting oil.

or

*100 pounds Dutch Boy white-lead.
½ gallon pure raw linseed oil.
2 gallons pure turpentine.
1 pint pure drier.

FORMULA NO. 12

Second Coat

Flat Finish

100 pounds Dutch Boy white-lead.
2 to 3 gallons Dutch Boy flatting oil.

or

*100 pounds Dutch Boy white-lead.
2 gallons pure turpentine.
1 pint pale varnish (suitable for enamel).
½ pint pure drier.

FORMULA NO. 13

Second Coat

Egg-Shell Gloss Finish

100 pounds Dutch Boy white-lead.
1½ to 2 gallons Dutch Boy flatting oil.
¾ gallon pale varnish (suitable for enamel).

or

*100 pounds Dutch Boy white-lead.
1½ to 2 gallons pure turpentine.
¾ gallon pale varnish (suitable for enamel).
½ pint pure drier.

*See 20. (b), page 5 of Notes.

20. (h) Formula No. 14. The flatting oil formula makes 6¼ gallons of paint, which should cover about 3,750 square feet, one coat. The turpentine formula makes 6 to 6½ gallons of paint, which should cover about 3,600 to 3,900 square feet, one coat.

20. (h) Formula No. 14A makes one gallon of paint, which should cover about 500 square feet, one coat.

20. (i) Formula No. 15 makes 9 gallons of paint, which should cover about 5,400 square feet, one coat.

20. (i) Formula No. 16. Hardwood floors are not often painted, but when it is desired to paint them with white-lead, specify formula No. 16.

20. (i) Formula No. 16 makes 10 gallons of paint, which should cover about 6,000 square feet, one coat.

20. (h) *Repainting Inside Wood*—Continued:

FORMULA NO. 14
Second Coat
Oil-Gloss Finish

The following formula shall be used for dark colors only:

100 pounds Dutch Boy white-lead.
3 gallons pure raw linseed oil.
¼ gallon Dutch Boy flatting oil.
1 pint pure drier.

or

*100 pounds Dutch Boy white-lead.
3 to 3½ gallons pure raw linseed oil.
1 pint pure turpentine.
1 pint pure drier.

FORMULA NO. 14A
Second Coat
Enamel Finish

The following formula shall be used for light colors:

3 pounds Dutch Boy white-lead.
1 gallon pale varnish (suitable for enamel).

The white-lead used shall be first mixed with turpentine in the proportion of 3 pounds to 1 gill and allowed to stand overnight. The thinners shall then be drawn off and the pale varnish added to the white-lead.

20. (i) *Painting Wood Floors:*

FORMULA NO. 15
Priming Coat
New Soft Wood Floors

100 pounds Dutch Boy white-lead.
4 gallons pure raw linseed oil.
2 gallons pure turpentine.
1 pint pure drier.

FORMULA NO. 16
Priming Coat
New Hardwood Floors

100 pounds Dutch Boy white-lead.
3 gallons pure raw linseed oil.
4 gallons pure turpentine.
1 pint pure drier.

*See 20. (b), page 5 of Notes.

20. (i) Formula No. 17 makes 6 gallons of paint, which should cover about 3,600 square feet, one coat.

20. (i) Formula No. 18 makes 6 gallons of paint, which should cover about 3,000 square feet, one coat.

20. (i) Formula No. 19. Porch floors require protection against moisture from the damp space beneath the porch. This space is frequently left without sufficient ventilation and if the soil is damp the porch floor cannot help absorbing a great deal of moisture. This is almost certain to cause blistering and peeling. To prevent trouble of this sort the underside of the floor, as well as the tongued and grooved edges of the boards, whether soft or hard wood, should be painted with Formula No. 19.

20. (i) Formula No. 19 makes 8¾ gallons of paint, which should cover about 5,250 square feet, one coat.

20. (j) In Formula No. 20, if boiled linseed oil cannot be obtained, 7 gallons raw linseed oil with 3 pints drier may be substituted and will in most cases give satisfactory results. Boiled oil is much superior, however, and will often obviate trouble when conditions are difficult. It seals pores in the plaster and prevents suction.

20. (j) Formula No. 20 makes 11 gallons of paint, which should cover about 5,500 square feet, one coat.

20. (i) *Painting Wood Floors*—Continued:

FORMULA NO. 17

Second Coat

100 pounds Dutch Boy white-lead.
1 gallon pure raw linseed oil.
2 gallons pure turpentine.
1 pint pure drier.

FORMULA NO. 18

Third Coat

100 pounds Dutch Boy white-lead.
1 gallon pure raw linseed oil.
1½ gallons pure turpentine.
½ gallon floor varnish (for porch floor painting, exterior floor varnish).
½ pint pure drier.

FORMULA NO. 19

Underside of Porch Floors

66 pounds Dutch Boy red-lead.
34 pounds Dutch Boy white-lead.
5 gallons pure raw linseed oil.
1 gallon pure turpentine.
¼ pint pure drier.

20. (j) *Painting Interior Plaster:*

FORMULA NO. 20

Priming Coat

100 pounds Dutch Boy white-lead.
7 gallons pure boiled linseed oil.
1 gallon pure turpentine.

20. (j) Formula No. 21. The flatting oil formula makes 5 to 6 gallons of paint, which should cover about 3,500 to 4,200 square feet, one coat. The turpentine and linseed oil formula makes 5½ gallons of paint, which should cover about 3,300 square feet, one coat.

20. (j) Formula No. 22. The flatting oil formula makes 5 to 6 gallons of paint, which should cover about 3,500 to 4,200 square feet, one coat. The turpentine and varnish formula makes 5 gallons of paint, which should cover about 3,000 square feet, one coat.

20. (j) Formula No. 23 makes 5 to 5½ gallons of paint, which should cover about 3,000 to 3,300 square feet, one coat.

20. (j) *Painting Interior Plaster*—Continued:

FORMULA NO. 21

Second Coat

100 pounds Dutch Boy white-lead.
2 to 3 gallons Dutch Boy flatting oil.

or

*100 pounds Dutch Boy white-lead.
½ gallon pure raw linseed oil.
2 gallons pure turpentine.
1 pint pure drier.

FORMULA NO. 22

Third Coat

Flat Finish

100 pounds Dutch Boy white-lead.
2 to 3 gallons Dutch Boy flatting oil.

or

*100 pounds Dutch Boy white-lead.
2 gallons pure turpentine.
1 pint pale varnish (suitable for enamel).
½ pint pure drier.

FORMULA NO. 23

Third Coat

Egg-Shell Gloss Finish

100 pounds Dutch Boy white-lead.
1½ to 2 gallons Dutch Boy flatting oil.
¾ gallon pale varnish (suitable for enamel).

or

*100 pounds Dutch Boy white-lead.
1½ to 2 gallons pure turpentine.
¾ gallon pale varnish (suitable for enamel).
½ pint pure drier.

*See 20. (b), page 5 of Notes.

20. (j) Formula No. 24. The flatting oil formula makes 6¼ gallons of paint, which should cover about 3,750 square feet, one coat. The turpentine formula makes 6 to 6½ gallons of paint, which should cover about 3,600 to 3,900 square feet, one coat.

20. (j) Formula No. 24A makes one gallon of paint, which should cover about 500 square feet, one coat.

20. (k) Formula No. 25 makes 6 gallons of paint, which should cover about 3,600 square feet, one coat.

20. (j) *Painting Interior Plaster*—Continued:

FORMULA NO. 24

Third Coat

Oil-Gloss Finish

The following formula shall be used for dark colors only:

100 pounds Dutch Boy white-lead.
3 gallons pure raw linseed oil.
¼ gallon Dutch Boy flatting oil.
1 pint pure drier.

or

*100 pounds Dutch Boy white-lead.
3 to 3½ gallons pure raw linseed oil.
1 pint pure turpentine.
1 pint pure drier.

FORMULA NO. 24A

Third Coat

Enamel Finish

The following formula shall be used for light colors:

3 pounds Dutch Boy white-lead.
1 gallon pale varnish (suitable for enamel).

The white-lead shall be first mixed with turpentine to the proportion of 3 pounds to 1 gill and allowed to stand overnight. The thinners shall then be drawn off and the pale varnish added to the white-lead.

20. (k) *Painting Metal:*

FORMULA NO. 25

Priming Coat

100 pounds Dutch Boy white-lead.
2 gallons pure raw linseed oil.
1 gallon pure turpentine
1 pint pure drier.

*See 20. (b), page 5 of Notes.

20. (k) Formula No. 26. The flatting oil formula makes 5 to 6 gallons of paint, which should cover about 3,500 to 4,200 square feet, one coat. The turpentine and linseed oil formula makes 5½ gallons of paint, which should cover about 3,300 square feet, one coat.

20. (k) Formula No. 27. The flatting oil formula makes 5 to 6 gallons of paint, which should cover about 3,500 to 4,200 square feet, one coat. The turpentine and varnish formula makes 5 gallons of paint, which should cover about 3,000 square feet, one coat.

20. (k) Formula No. 28 makes 5 to 5½ gallons of paint, which should cover about 3,000 to 3,300 square feet, one coat.

20. (l) Formula No. 29 makes 10¾ gallons of paint, which should cover about 5,375 square feet, one coat.

20. (k) *Painting Metal*—Continued:

FORMULA NO. 26

Second Coat

100 pounds Dutch Boy white-lead.
2 to 3 gallons Dutch Boy flatting oil.

or

*100 pounds Dutch Boy white-lead.
½ gallon pure raw linseed oil.
2 gallons pure turpentine.
1 pint pure drier.

FORMULA NO. 27

Third Coat

Flat Finish

100 pounds Dutch Boy white-lead.
2 to 3 gallons Dutch Boy flatting oil.

or

*100 pounds Dutch Boy white-lead.
2 gallons pure turpentine.
1 pint pale varnish (suitable for enamel).
½ pint pure drier.

FORMULA NO. 28

Third Coat

Egg-Shell Gloss Finish

100 pounds Dutch Boy white-lead.
1½ to 2 gallons Dutch Boy flatting oil.
¾ gallon pale varnish (suitable for enamel).

or

*100 pounds Dutch Boy white-lead.
1½ to 2 gallons pure turpentine.
¾ gallon pale varnish (suitable for enamel).
½ pint pure drier.

20. (l) *Painting Brick and Stucco:*

FORMULA NO. 29

Priming Coat

100 pounds Dutch Boy white-lead.
7 gallons pure boiled linseed oil
(or 7 gallons pure raw linseed oil and 1½ pints pure drier).
1 gallon turpentine.

*See 20. (b), page 5 of Notes.

20. (l) Formula No. 30 makes 7¾ gallons of paint, which should cover about 4,650 square feet, one coat.

20. (l) Formula No. 31 makes 6½ gallons of paint, which should cover about 3,900 square feet, one coat.

20. (m) Concrete and stone are not as porous as brick and stucco and should therefore be treated differently. Three coats of paint should always be applied.

20. (m) Formula No. 32 makes 8¾ gallons of paint, which should cover about 4,375 square feet, one coat.

20. (m) Formula No. 33 makes 6½ gallons of paint, which should cover about 3,900 square feet, one coat.

20. (m) Formula No. 34 makes 6½ gallons of paint, which should cover about 3,900 square feet, one coat.

20. (l) *Painting Brick and Stucco*—Continued:

FORMULA NO. 30

Second Coat

100 pounds Dutch Boy white-lead.
4 gallons pure linseed oil (⅓ boiled, ⅔ raw)
(or 4 gallons pure raw linseed oil and 1 pint pure drier).
1 gallon pure turpentine.

FORMULA NO. 31

Third Coat

100 pounds Dutch Boy white-lead.
3½ gallons pure linseed oil (⅓ boiled, ⅔ raw)
(or 3½ gallons pure raw linseed oil and 1 pint pure drier).
1 pint pure turpentine.

20. (m) *Painting Concrete and Stone:*

FORMULA NO. 32

Priming Coat

100 pounds Dutch Boy white-lead.
5 gallons pure boiled linseed oil
(or 5 gallons pure raw linseed oil and 1 pint pure drier).
1 gallon pure turpentine.

FORMULA NO. 33

Second Coat

100 pounds Dutch Boy white-lead.
3 gallons pure linseed oil (⅓ boiled, ⅔ raw)
(or 3 gallons pure raw linseed oil and 1 pint pure drier).
½ gallon pure turpentine.

FORMULA NO. 34

Third Coat

100 pounds Dutch Boy white-lead.
3½ gallons pure linseed oil (⅓ boiled, ⅔ raw)
(or 3½ gallons pure raw linseed oil and 1 pint pure drier).
1 pint pure turpentine.

Section C. The specification writer is not confined to the method of procedure suggested in Section C on the opposite page. He may wish to follow his own method of detailing the work and giving painting instructions. In this case it will be found that Section C contains all data and information necessary to cover this essential part of the specification.

All formulas recommended in Section C will be found in this specification as indicated below:

23. (b) The formula numbers in parentheses give several finishes from which to choose. Formula No. 8 produces a flat finish; No. 9, egg-shell gloss; No. 10, oil-gloss; and No. 10A, enamel finish.

24. (b) The formula numbers in parentheses give several finishes from which to choose. Formula No. 12 produces a flat finish; No. 13, egg-shell gloss; No. 14, oil-gloss; and No. 14A, enamel finish.

SECTION C

Application of the Paint

(See first three notes at top of opposite page)

21. PAINTING NEW OUTSIDE WOOD:

(a) (Here list and describe surfaces to be painted.)

(b) All woodwork shall be primed with formula No. 1 and shall receive two additional coats, using formulas No. 2 and No. 3, respectively.

(c) (If colors other than white are to be used, specifications of colors and where they are to be used should be given here.)

22. REPAINTING OUTSIDE WOOD:

(a) (Here list and describe surfaces to be painted.)

(b) All woodwork shall receive two coats, using formulas No. 4 and No. 5, respectively.

(c) (If colors other than white are to be used, specifications of colors and where they are to be used should be given here.)

23. PAINTING NEW INSIDE WOOD:

(a) (Here list and describe surfaces to be painted.)

(b) All woodwork shall be primed with formula No. 6, and shall receive two additional coats, using formula No. 7 for the second coat and formula No. (8, *flat finish;* 9, *egg-shell gloss;* 10, *oil-gloss;* or 10A, *enamel finish*) for the finishing coat.

(c) (If colors other than white are to be used, specifications of colors and where they are to be used should be given here.)

24. REPAINTING INSIDE WOOD:

(a) (Here list and describe surfaces to be painted.)

(b) All woodwork shall receive two coats, using formula No. 11 for the first coat and formula No. (12, *flat finish;* 13, *egg-shell gloss;* 14, *oil-gloss;* or 14A, *enamel finish*) for the finishing coat.

(c) (If colors other than white are to be used, specifications of colors and where they are to be used should be given here.)

27.(c)If the porch floor is made of hardwood, Formula No. 16 should be specified for the priming coat. In repainting over old paint, no priming coat need be specified.

28.(b)In repainting over old paint, no priming coat need be specified. The formula numbers in parentheses give several finishes from which to choose. Formula No. 22 produces a flat finish; No. 23, egg-shell gloss; No. 24, oil-gloss; and No. 24A, enamel finish.

28.(b)The architect may wish to include in his specifications one or more of the many blended, figured or mottled wall effects obtainable with white-lead paint and suitable for the decoration of interior plaster and other interior wall surfaces. For his convenience National Lead Company will send on request illustrations and descriptions of the most popular blended, figured and mottled wall effects, telling how to produce them with white-lead formulas and where they are best used from a decorative standpoint.

25. PAINTING SOFT WOOD FLOORS:

(a) (Here list and describe surfaces to be painted.)

(b) All floors not previously painted shall be primed with formula No. 15 and shall receive two additional coats, using formulas No. 17 and No. 18, respectively. All floors previously painted do not require the priming coat.

26. PAINTING HARDWOOD FLOORS:

(a) (Here list and describe surfaces to be painted.)

(b) All floors not previously painted shall be primed with formula No. 16 and shall receive two additional coats, using formulas No. 17 and No. 18, respectively. All floors previously painted do not require the priming coat.

27. PAINTING PORCH FLOORS:

(a) (Here list and describe surfaces to be painted.)

(b) Underside of all floors and the tongued and grooved edges of the boards shall receive one coat, using formula No. 19.

(c) Top surface of all floors not previously painted shall be primed with formula No. 15, and shall receive two additional coats, using formulas No. 17 and No. 18, respectively. All floors previously painted shall be touched up on worn places, using formula No. 17, after which a finishing coat shall be applied using formula No. 18.

28. PAINTING PLASTER:

(a) (Here list and describe surfaces to be painted, specifying finish to be used.)

(b) All walls not previously painted shall be primed with formula No. 20, and shall receive two additional coats, using formula No. 21 for the second coat and formula No. (22, *flat finish;* 23, *egg-shell gloss;* 24, *oil-gloss;* or 24A, *enamel finish*) for the finishing coat. All walls previously painted do not require the priming coat.

(c) (If colors other than white are to be used, specifications of colors and where they are to be used should be given here.)

29. PAINTING METAL:

(a) (Here list and describe surfaces to be painted.)

(b) All work which is delivered primed shall receive two coats, using formula No. 26 for the first coat and formula No. (27, *flat finish;* or 28, *egg-shell gloss finish*) for the finishing coat.

(c) All work which is delivered unprimed shall receive three coats of paint, using formula No. 25 for the priming coat, formula No. 26 for the second coat and formula No. (27, *flat finish;* or 28, *egg-shell gloss finish*) for the finishing coat.

(d) (If colors other than white are to be used, specifications of colors and where they are to be used should be given here.)

30. PAINTING BRICK AND STUCCO:

(a) (Here list and describe surfaces to be painted.)

(b) All brick and stucco surfaces not previously painted shall be primed with formula No. 29 and shall receive two additional coats, using formulas No. 30 and No. 31, respectively. All brick and stucco surfaces previously painted do not require the priming coat.

(c) (If brick is to be lined off, it should be so specified here.)

31. PAINTING CONCRETE AND STONE:

(a) (Here list and describe surfaces to be painted.)

(b) All concrete and stone surfaces not previously painted shall be primed with formula No. 32 and shall receive two additional coats, using formulas No. 33 and No. 34, respectively. All concrete and stone surfaces previously painted do not require the priming coat.

SUPPLEMENT

A.S.T.M. AND GOVERNMENT SPECIFICATIONS

On the following pages will be found specifications of the American Society for Testing Materials and of the United States Government, on the paint materials listed below:

AMERICAN SOCIETY FOR TESTING MATERIALS

STANDARD SPECIFICATIONS

FOR

BASIC CARBONATE WHITE-LEAD

*Serial Designation: D 81—24**

These specifications are issued under the fixed designation D 81; the final number indicates the year of original adoption as standard or, in the case of revision, the year of last revision.

Issued as Tentative 1921; Adopted in Amended Form, 1924.

1. These specifications cover what is commonly known as Basic Carbonate White-Lead as used as a pigment and in putty, purchased either as dry pigment or ground in oil to form a paste.

I. Manufacture

2. (a) *Dry Pigment.*—The pigment shall be the product made from metallic lead and shall have a composition corresponding approximately to the formula $2PbCO_3.Pb(OH)_2$. It shall be thoroly washed after corroding, shall be free from impurities and adulterants, and shall meet the requirement given in Section 3.

(b) *Paste.*—The paste shall be made by thoroly grinding the specified pigment with pure raw or refined linseed oil.

II. Properties and Tests

3. (a) *Dry Pigment.*—The pigment shall conform to the following requirements:

	Maximum	*Minimum*
Coarse particles retained on a standard No. 325 screen**, per cent.	1.0	....
Lead carbonate, per cent	75.0	65.0
Total impurities, including moisture, per cent	2.0	....

*Subject to any revision if and when made.

**For determining coarse particles, screens 3 in. in diameter are recommended. The screen cloth is described as follows: No. 325 cloth of the U. S. Standard Sieve Series should be made of wire 0.036 mm. (0.0014 in.) in diameter, a tolerance of 15 per cent under and 35 per cent over being allowed on this diameter. The average opening between adjacent parallel wires should be 0.044 mm. (0.0017 in.), the tolerance being 8 per cent with the additional limitation that the maximum opening shall not exceed 0.044 mm. by more than 90 per cent.

The color and color strength, when specified, shall be equal to that of a sample mutually agreed on by buyer and seller.

(b) *Paste.*—The paste as received shall not be caked in the container and shall break up readily in oil to form a smooth paint of brushing consistency. The paste shall conform to the following requirements:

	Maximum	*Minimum*
Pigment (as specified above) per cent	92	90
Linseed oil, per cent	10	8
Moisture and other volatile matter, per cent	0.7	..
Coarse particles and skins (total residue retained on a standard No. 325 screen† based on pigment) per cent	1.5	..

4. One sample shall be taken at random from each lot of 1000 packages or less. If the packages are of such size that 1000 packages amount to more than a carload, one sample shall be taken at random from each carload.

†For determining coarse particles, screens 3 in. in diameter are recommended. The screen cloth is described as follows: No. 325 cloth of the U. S. Standard Sieve Series should be made of wire 0.036 mm. (0.0014 in.) in diameter, a tolerance of 15 per cent under and 35 per cent over being allowed on this diameter. The average opening between adjacent parallel wires should be 0.044 mm. (0.0017 in.) the tolerance being 8 per cent with the additional limitation that the maximum opening shall not exceed 0.044 mm. by more than 90 per cent.

AMERICAN SOCIETY FOR TESTING MATERIALS

TENTATIVE SPECIFICATIONS

FOR

PURITY OF RAW LINSEED OIL FROM SOUTH AMERICAN SEED

*Serial Designation: D 77—21 T**

This is a tentative Standard only, published for the purpose of eliciting criticism and suggestions. It is not a Standard of the Society and until its adoption as Standard it is subject to revision.

Issued, 1921

I. Properties and Tests

1. Properly clarified raw linseed oil from South American seed shall conform to the following requirements:

	Maximum	*Minimum*
Specific gravity at 15.5° C	0.9360	0.9310
Acid number	6.00	.....
Saponification number	195	189
Unsaponifiable matter, per cent	1.50	.....
Refractive index at 25° C	1.4805	1.4780
Iodine number (Hanus)	.....	170

II. Methods of Testing

2. The oil shall be tested in accordance with the methods recommended in Section 2 of the Standard Specifications for Purity of Raw Linseed Oil from North American Seed (Serial Designation: D 1) of the American Society for Testing Materials.†

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*Subject to any revision if and when made.

†1921 Book of A. S. T. M. Standards (page 23 of this book).

AMERICAN SOCIETY FOR TESTING MATERIALS

STANDARD SPECIFICATIONS

FOR

PURITY OF RAW LINSEED OIL FROM NORTH AMERICAN SEED

*Serial Designation: D 1—15**

These specifications are issued under the fixed designation D 1; the final number indicates the year of original adoption as standard, or in the case of revision, the year of last revision.

Adopted, 1913; Revised, 1915

I. Properties and Tests

1. Raw linseed oil from North American Seed shall conform to the following requirements:

	Maximum	*Minimum*
Specific gravity at $\frac{15.5^\circ}{15.5^\circ}$ C	0.936	0.932
or		
Specific gravity at $\frac{25^\circ}{25^\circ}$ C	0.931	0.927
Acid number	6.00	.....
Saponification number	195	189
Unsaponifiable matter, per cent	1.50	.....
Refractive index at 25° C	1.4805	1.4790
Iodine number (Hanus)	.....	180

II. Method of Testing

2. The recommended methods of testing are as follows:

General—All tests shall be made on oil which has been filtered at a temperature of between 60 and 80° F. thru paper in the laboratory immediately before weighing out. The sample should be thoroly agitated before the removal of a portion for filtration or analysis.

*Subject to any revision if and when made.

Specific Gravity.—Use a pyknometer, accurately standardized and having a capacity of at least 25 cc., or any other equally accurate method, making a test at 15.5° C., water being 1 at 15.5° C., or a test at 25° C., water being 1 at 25° C.

Acid Number.—Expressed in milligrams of KOH per gram of oil. Follow the method described in Bulletin No. 107, revised 1908, Department of Agriculture, Bureau of Chemistry, page 142.

Saponification Number.—Expressed as with Acid Number. Blanks should also be run to cover effect of alkali in glass. Follow method given in Bulletin No. 107, revised 1908, Department of Agriculture, Bureau of Chemistry, pages 137-138.

Unsaponifiable Matter.—Follow Boemer's method taken from his Ubbelohde Handbuch Der Ole u. Fette, pages 261-262. "To 100 g. of oil in a 1000 to 1500-cc. Erlenmeyer flask add 60 cc. of an aqueous solution of potassium hydroxide (200 g. KOH dissolved in water and made up to 300 cc.) and 140 cc. of 95 per cent alcohol. Connect with a reflux condenser and heat on the water bath, shaking at first until the liquid becomes clear. Then heat for one hour with occasional shaking. Transfer while yet warm to a 2000-cc. separatory funnel to which some water has been added, wash out the Erlenmeyer with water using in all 600 cc. Cool, add 800 cc. of ether and shake vigorously one minute. In a few minutes the ether solution separates perfectly clear. Draw off the soap and filter the ether (to remove last traces of soap) into a large Erlenmeyer and distill off the ether, adding if necessary one or two pieces of pumice stone. Shake the soap solution three times with 400 cc. of ether, which add to the first ether extract. To the residue left after distilling the ether add 3 cc. of the above KOH solution, and 7 cc. of the 95 per cent alcohol, and heat under reflux condenser for ten minutes on the water bath, transfer to a small separatory funnel, using 20 to 30 cc. of water, and after cooling shake out with two portions of 100 cc. of ether; wash the ether three times with 10 cc. of water. After drawing off the last of the water, filter the ethereal solution so as to remove the last drops of water, distill off the ether dry residue in water oven and weigh."

Or any accurate method involving the extraction of the dried soap may be used.

Refractive Index.—Use a properly standardized Abbe Refractometer at 25° C., or any other equally accurate instrument.

Iodine Number (Hanus).—Follow the Hanus method as described in Bulletin No. 107, revised 1908, Department of Agriculture, Bureau of Chemistry, page 136.

AMERICAN SOCIETY FOR TESTING MATERIALS

STANDARD SPECIFICATIONS

FOR

TURPENTINE

*Serial Designation: D 13—24**

These specifications are issued under the fixed designation D 13; the final number indicates the year of original adoption as standard, or, in the case of revision, the year of last revision.

Adopted 1915; Resubmitted as Tentative, 1920; Adopted in Amended Form, 1924.

1. These specifications apply both to the turpentine that is distilled from the pine oleoresins, commonly known as "gum spirits" or "spirits of turpentine", and to turpentine commonly known as "wood turpentine", which is obtained from resinous wood, whether by steam or by destructive distillation. When ordering under these specifications, the purchaser shall specify whether (a) gum spirits or (b) wood turpentine is desired. When wood turpentine is specified, it may be stated whether steam or destructively distilled wood turpentine shall be furnished.

I. Properties and Tests

2. Turpentine shall be pure and conform to the following requirements:

3. The turpentine shall be clear and free from suspended matter and water.

4. The color shall be "Standard" or better.

5. The odor shall be characteristic of the variety of turpentine specified and, if desired, shall conform to the odor of the sample agreed upon.

6. Other properties shall be as follows:

	Maximum	*Minimum*
Specific gravity, 15.5°/15.5° C	0.875	0.862
Refractive index at 20° C.—		
Gum spirits	1.478	1.465
Wood turpentine	1.478	1.465
Residue after polymerization with 38 N H_2SO_4:		
Gum spirits—		
Volume, per cent	2.0	.....
Refractive index at 20° C	.....	1.500
Wood turpentine—		
Volume, per cent	2.5	.....
Refractive index at 20° C	.....	1.48
Initial boiling point at 760 mm. pressure	160° C	150° C
Distilling below 170° C at 760 mm. pressure, per cent	.....	90

*Subject to any revision if and when made.

II. Detection and Removal of Separated Water

7. Draw a portion by means of a glass or metal container with a removable stopper or top, or with a "thief," from the lowest part of the container, or by opening the bottom valve of the perfectly level tank car. If water is found to be present draw it all out, record the quantity, and deduct it from the total volume of liquid delivered.

UNITED STATES GOVERNMENT SPECIFICATION

FOR

LIQUID PAINT DRIER

FEDERAL SPECIFICATIONS BOARD

*Standard Specification No. 20**

This specification was officially adopted by the Federal Specifications Board on February 3, 1922, for the use of the departments and independent establishments of the Government in the purchase of materials covered by it.

I. General

This specification applies both to straight oil drier—that is, material free from resins or "gums"—and to Japan drier; that is, material containing varnish "gums."

The drier shall be composed of lead, manganese, or cobalt, or a mixture of any of these elements combined with a suitable fatty oil, with or without resins or "gums", and mineral spirits or turpentine, or a mixture of these solvents. It shall be free from sediment and suspended matter. The drier when flowed on metal and baked for 2 hours at 100° C (212° F.) shall leave an elastic film. The flash point shall be not lower than 30° C. (85° F.) when tested in a closed-cup tester. It shall mix with pure raw linseed oil in the proportion of 1 volume of drier to 19 volumes of oil without curdling, and the resulting mixture when flowed on glass shall dry in not more than 18 hours. When mixed with pure raw linseed oil in the proportion of 1 volume of drier to 8 volumes of oil, the resulting mixture shall be no darker than a solution of 6 g of potassium dichromate in 100 cc. of pure sulphuric acid of specific gravity 1.84.

Note.—Deliveries will, in general, be sampled and tested by the following methods, but the purchaser reserves the right to use any additional available information to ascertain whether the material meets the specification.

*Subject to any revision if and when made.

II. Sampling

It is mutually agreed by buyer and seller that a single package out of each lot of not more than 1000 packages be taken as representative of the whole. Whenever possible, an original unopened container shall be sent to the laboratory, and when for any reason this is not done, the inspector shall thoroly mix the contents of the container sampled, transfer not less than one quart to a clean, dry glass bottle or tin can which must be nearly filled with the sample, securely stoppered with a new clean cork or well-fitting cover or cap, sealed, and distinctly labeled by the inspector. The inspector should take a duplicate from the container sampled to be held for check in case of dispute, and, when requested, should take a sample for the seller.

III. Laboratory Examination

(a) *Sediment and Suspended Matter.*—Thoroly mix the sample. Fill two test tubes of the same size (15 cm., or 6 inches) to within 2.5 cm. (1 inch) of the top with the sample. Stopper the tubes with clean corks. Let stand for 24 hours. Note whether sediment is evident in the tubes; if not, shake one tube vigorously and compare the two tubes. If they still look alike, the sample is considered free from sediment and suspended matter.

(b) *Color.*—Mix 2 cc. drier and 16 cc. clear pure raw linseed oil that complies with the specifications of B. S. Circular No. 82. Dissolve 6 g of pure powdered potassium dichromate in 100 cc. of pure concentrated sulphuric acid (specific gravity 1.84). Gentle heat may be used if necessary to secure a perfect solution of the dichromate. This solution should be freshly prepared. The color comparison shall be made by placing the 1.8 drier-linseed oil mixture and the dichromate-sulphuric acid solution in thin-walled glass tubes of the same diameter, 1.5 to 2 cm. (5/8 to 13/16 inch) to depths of at least 2.5 cm. (1 inch) and comparing the depth of color by looking thru the tubes across the column of liquid by transmitted light.

(c) *Mixing with Linseed Oil, Setting to Touch, and Drying.*—Mix 1 cc. of sample and 19 cc. of clear pure raw linseed oil that complies with the specifications of B. S. Circular No. 82. Thoroly clean a glass plate, finally washing with benzol and drying. Pour a portion of the mixture of linseed oil and drier over this plate and place the plate in a vertical position in a well-ventilated room, the atmosphere of which is free from products of combustion or laboratory fumes. Allow the remainder of the mixture to stand for 2 hours. No sediment or precipitate should appear. At 1-hour intervals examine the film of oil on the plate by touching it lightly with the finger at points not less than 2.5 cm. (1 inch) from the edges. If the film still has the greasy feel of fresh linseed oil, it has not set to touch. If the film feels tacky and adheres to the finger, it is considered to have set to touch. If the finger can be drawn lightly across the film without the oil sticking to the finger or the surface being marred by this treatment, the oil is considered dry. In case the test shows time of setting to touch or drying greater than 8 to 18 hours, respectively, a second test shall be run on a different day and the average of the two tests taken.

(d) *Nature of Baked Film.*—Thoroly clean with benzol a piece of bright sheet metal, either bright sheet iron, tin plate, or terneplate. Shake the sample of drier thoroly and flow enough on the plate so that a space at least 7.5 cm. (3 inches) wide is covered. Allow the plate to stand in a vertical position at room temperature for 30 minutes and then hang in an oven at a temperature of 100 to 105° C (212 to 221° F.) for 2 hours.

Remove the plate from the oven and allow it to stand at room temperature for not less than 1 hour. Test the film of drier with a knife blade at a point not less than 2.5 cm. (1 inch) from the edge. If the film powders or particles fly under the knife blade, it will be considered brittle, which will be cause for rejection.

(e) *Flash Point.*—Determine with either the "Tag" or Elliott closed-cup tester.The former is preferred.*

*Directions for using the Tag tester may be found in A. S. T. M. Standards D 56-21, and directions for using the Elliott cup in Proceedings A. S. T. M., 1917, pt. I, p. 414.

AMERICAN SOCIETY FOR TESTING MATERIALS

TENTATIVE SPECIFICATIONS

FOR

PURITY OF BOILED LINSEED OIL FROM SOUTH AMERICAN SEED*

*Serial Designation: D 78—21 T***

This is a Tentative Standard only, published for the purpose of eliciting criticism and suggestions. It is now a Standard of the Society and until its adoption as Standard it is subject to revision.

Issued, 1921

I. Properties and Tests

1. Boiled linseed oil from South American seed shall conform to the following requirements:

	Maximum	*Minimum*
Specific gravity at 15.5°/15.5° C	0.945	0.936
Acid number	8.00	.....
Saponification number	195	189
Unsaponifiable matter, per cent	1.50	.....
Refractive index at 25° C	1.4840	1.4780
Iodine number (Hanus)	.....	168
Ash, per cent	0.7	0.2
Manganese, per cent	.....	0.03
Calcium, per cent	0.3	.....
Lead, per cent	.....	.....

II. Methods of Testing

2. The oil shall be tested in accordance with the methods recommended in Section 2 of the Standard Specifications for Purity of Boiled Linseed Oil from North American Seed (Serial Designation: D 11)† of the American Society for Testing Materials†.

*Criticisms of these Tentative Specifications are solicited and should be directed to Mr. R. L. Hallett, Secretary of Committee D-1 on Preservative Coatings for Structural Materials, 105 York Street, Brooklyn, N. Y.

**Subject to any revision if and when made.

†1921 Book of A. S. T. M. Standards (page 30 of this book).

AMERICAN SOCIETY FOR TESTING MATERIALS

STANDARD SPECIFICATIONS

FOR

PURITY OF BOILED LINSEED OIL FROM NORTH AMERICAN SEED

*Serial Designation: D 11—15**

These specifications are issued under the fixed designation D 11; the final number indicates the year of original adoption as standard, or in the case of revision, the year of last revision.

Adopted, 1915

I. Properties and Tests

1. Boiled linseed oil from North American seed shall conform to the following requirements:

	Maximum	*Minimum*
Specific gravity at $\frac{15.5^\circ}{15.5^\circ}$ C.	0.945	0.937
Acid number	8	.....
Saponification number	195	189
Unsaponifiable matter per cent	1.5	.....
Refractive index at 25° C.	1.484	1.479
Iodine number (Hanus)	.....	178
Ash, per cent	0.7	0.2
Manganese, per cent	.....	0.03
Calcium, per cent	0.3	.....
Lead, per cent	.....	0.1

II. Methods of Testing

2. The recommended methods of testing are as follows:

General.—The sample should be thoroly agitated before the removal of a portion for analysis.

Specific Gravity.—Use a pyknometer, accurately standardized and having a capacity of at least 25 cc., or any other equally accurate method, making a test of 15.5° C., water being 1 at 15.5° C.

*Subject to any revision if and when made.

Acid Number.—Expressed in milligrams of KOH per gram of oil. Follow the method described in Bulletin No. 107, revised 1908, Department of Agriculture, Bureau of Chemistry, page 142.

Saponification Number.—Expressed as with Acid Number. Blanks should also be run to cover effect of alkali in glass. Follow method given in Bulletin No. 107, revised 1908, Department of Agriculture, Bureau of Chemistry, pages 137-138.

Unsaponifiable Matter.—Follow Boemer's method taken from his Ubbelohde Handbuch Der Ole u. Fette, pages 261-262. "To 100 g. of oil in a 1000 to 1500 cc. Erlenmeyer flask add 60 cc. of an aqueous solution of potassium hydroxide (200 g. KOH dissolved in water and made up to 300 cc.) and 140 cc. of 95 per cent alcohol. Connect with a reflux condenser and heat on the water bath, shaking at first until the liquid becomes clear. Then heat for one hour with occasional shaking. Transfer while yet warm to a 2000 cc. separatory funnel to which some water has been added, wash out the Erlenmeyer with water using in all 600 cc. Cool, add 800 cc. of ether and shake vigorously one minute. In a few minutes the ether solution separates perfectly clear. Draw off the soap and filter the ether (to remove last traces of soap) into a large Erlenmeyer and distill off the ether, adding if necessary one or two pieces of pumice stone. Shake the soap solution three times with 400 cc. of ether, which add to the first ether extract. To the residue left after distilling the ether add 3 cc. of the above KOH solution, and 7 cc. of the 95 per cent alcohol, and heat under reflux condenser for ten minutes on the water bath. Transfer to a small separatory funnel, using 20 to 30 cc. of water, and after cooling shake out with two portions of 100 cc. of ether; wash the ether three times with 10 cc. of water. After drawing off the last of the water, filter the ethereal solution so as to remove the last drops of water, distill off the ether, dry residue in water oven and weigh."

Or, any accurate method involving the extraction of the dried soap may be used.

Refractive Index.—Use a properly standardized Abbe Refractometer at 25° C., or any other equally accurate instrument.

Iodine Number (Hanus).—Follow the Hanus method as described in Bulletin No. 107, revised 1908, Department of Agriculture, Bureau of Chemistry, page 136.

Ash.—The determination of the percentage of ash and the constituents thereof may be made by any method which gives accurate results.